

Installation Guide Specification
For EnduraRock System

I. GENERAL

1.01 SUMMARY

- A. The ENDURATECH Premier Roofing System is a seamless insulating and waterproofing system for flat roof applications. The system employs spray-applied polyurethane foam to both insulate and watertight with a ¾- to 1-inch layer of gravel for ultra-violet (UV) light protection.
- B. The EnduraRock system is designed to provide a UL Class A system for flat roofs. The choice of this system for any given situation is the responsibility of the Contractor, Specifier, or Building Owner. It is the responsibility of the Contractor, Specifier, or Building Owner to evaluate the load bearing capacity of the roof deck to insure safe weight limits are not exceeded.

1.02 QUALITY ASSURANCE

- A. Qualified Applicator Requirements: Warranties will only be issued by NCFI for jobs installed by Tier One Applicators having a Tier One Applicator's Agreement current and in effect.
- B. Job Approval: Every job considered for an NCFI warranty is subject to inspection and approval by NCFI prior to the commencement of work. NCFI reserves the right to refuse to warrant any job where it deems the job or the applicator unsuitable for the ENDURATECH Premier Roofing System.

1.03 SUBMITTALS

Prior to job commencement and warranty request approval, the following must be submitted:

- Request for Warranty Form
- Job specifications
- Roof sketch/diagram with dimensions
- Photos of roof
- Core cut down to the deck.

II. PRODUCTS

2.01 POLYURETHANE FOAM

The foam used shall be NCFI Chemical System 10-001. The proper chemical system speed must be used for the appropriate temperature conditions:

Chemical System

Minimum Air Temperature

Fast	50°F
Regular	60 °F
Slow	75 °F

2.02 EDGE AND SIDEWALL COATING

For vertical surfaces, details, exposed edges, and other areas where gravel may not be stable, apply NCFI ENDURATECH approved coating.

2.03 GRAVEL

Gravel will meet ASTM specification D1863-83 Size No. 6 (nominally ½ to 1 in.) or Size No. 7 (nominally 3/8 to 3/4 in.). Experience suggests optimum coverage is achieved using crushed gravel (as opposed to round, river gravel).

2.04 UNDERLAYMENTS

FIBER BOARD: Fiber board underlayments will be ½ inch minimum thickness and will meet ASTM specification C208-72 and will be of the “Sheathing, Regular Density” (often termed “high density roof insulation board”) type.

2.05 MESH

Mesh to be used on a metal deck to achieve a level finished foam surface, use the following mesh or equal:

HILCO Fiberglass Fabric: Asphalt treated, 20 x 10 count, fiberglass mesh.
(Available from: E. L. Hilts & Co., Hickory, NC, 800-354-4587)

2.06 SPRAY POLYURETHANE FOAM ADHESIVE

When securing underlayment boards with spray-applied, polyurethane foam adhesives, use the following:

NCFI Spray Adhesive 13-003

2.07 FASTENERS

Fasteners for use on steel decks will be OMG Roof Insulation Fasteners # 12-11 or equivalent with 3-inch diameter galvanized plates.

2.08 PRIMERS

A. Foam-to-Foam and Foam-to-Porous Surfaces:

NCFI ENDURATECH AP
NCFI ENDURATECH XP

B. Foam to Other Surfaces

Contact NCFI for specific recommendations.

2.09 OPEN MESH TRAFFIC MATS

Where traffic mats are required, use open mesh type such as one of the following (available from Tennessee Mat Co., Nashville, TN 800-264-3030) or equivalent:

Wearwell Fabric Flexible Link Mat Product # 407

Wearwell "Tandem" Uni-Link Rubber Safety Matting Product # 408

Wearwell WorkSafe Product # 477

III. EXECUTION

3.01 SURFACE PREPARATION

A. Reroofing and General Requirements

1. Roof Deck: It is the responsibility of the Contractor, Specifier, or Building Owner to determine the state of and the load bearing characteristics of the roof deck. The deck should be examined for rot, corrosion, and other deterioration and weak areas repaired.
2. Surface Preparation: All loose aggregate, dirt, debris, grease, and oil must be removed from the existing roof surface by power brooming, hydro-vacuuming, or other appropriate means. Loose membrane seams and other openings must be mechanically secured but may be left air and water vapor permeable. Loose, damaged, and deteriorated rated flashings, details, and equipment must be repaired, secured, or removed. All metal surfaces to be coated or foamed must be degreased and primed. Membrane blisters must be split and the membrane secured. Loose laid membranes must be removed or secured.
3. Slope Requirements: The roof slope may not exceed 3/8 inch per horizontal foot.

B. New Construction:

1. Concrete Decks: The concrete deck must be fully cured and primed. Lightweight concrete decks are not approved for direct application of polyurethane foam.
2. Metal Decks: To achieve a flat, final foam surface, use one of the following methods:
 - a. Underlayment Board Method
 - 1) Secure the underlayment sheets to the steel deck using one of the following techniques:
 - a) Spray apply NCFI Spray Adhesive 13-003 to the metal deck and install the underlayment sheets into the adhesive before it has reached its tack free state.
 - b) Mechanically fasten underlayment sheets to the steel deck using eleven (11) fasteners per 4 x 8 ft sheet per attached Fastener Pattern.
 - 2) Spray the foam onto the dry surface of the underlayment.
 - b. Flute Filling Method

- 1) Fill the steel deck flutes with spray-applied polyurethane foam, avoiding spraying onto the deck flanges.
- 2) Remove excessive foam that is higher than the height of the flange.
- 3) Spray foam onto the deck and the filled deck flutes to achieve a relatively flat finished foam surface.

c. Mesh Method

- 1) Apply fabric mesh (as specified in Section 2.05 above). Roll out the fabric across the roof deck, spanning the flutes. Pull taut to the deck surface.
- 2) Secure the mesh in place with small amounts of spray foam or approved fasteners.
- 3) Spray the foam onto the mesh surface.

C. Existing Spray Foam Roofs

1. Scarf off old coating down to adhered, closed-cell foam.
2. Allow exposed foam to dry.
3. Apply primer to scarfed, dry foam. See Section 2.08 above for recommended primers. Follow recommendations of primer manufacturer.
4. Apply new foam to the dry, primed foam surface.

D. Tear-offs: Roofs or roof sections may require tear-offs due to deck deterioration, excessive weight, existing insulation deterioration, or inability to secure loose existing substrates to the deck. Specific treatment of these roofs or roof sections depends on the deck type.

3.02 FOAM APPLICATION

A. Weather Conditions: Foam cannot be applied during periods of precipitation or when precipitation is imminent. The ambient temperature must be above 50°F. Ambient humidity must be monitored before and during the application of foam with a psychrometer; wet bulb measurements must not exceed the maximums for a given dry bulb measurement as defined by NCFI's Applicator Bulletin on Wet Bulb/Dry Bulb Thermometer (see Table I below). Wind speeds should not exceed 15 mph. To avoid overspray, wind screens are recommended.

TABLE 1

MAXIMUM WET BULB READINGS FOR GIVEN DRY BULB READING
(°F)

Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb	Dry Bulb	Wet Bulb
50	45½	60	55½	70	65½	80	73½	90	79½
51	46½	61	56½	71	66½	81	74½	91	80
52	47½	62	57½	72	67½	82	75	92	80½
53	48½	63	58½	73	68	83	75½	93	81
54	49½	64	59½	74	69	84	76	94	81½
55	50½	65	60½	75	70	85	77	95	82
56	51½	66	61½	76	70½	86	77½	96	82
57	52½	67	62½	77	71½	87	78	97	82½
58	53½	68	63½	78	72	88	78½	98	82½
59	54½	69	64½	79	73	89	79	99	83
								100	83

- B. Surface Conditions: All surfaces to be sprayed with foam must be free of all forms of moisture and ice. Surfaces can be checked with NCR MDP (Moisture Detection Paper) strips prior to and during foam application.

All surfaces must be free of dust, loose aggregate, grease, oil, and solvents.

- C. Foam Thickness:

- Existing Built-up Roofs: Foam thickness should not be less than 1.5 inches when applying to an existing built-up roof. (See Note on Coal Tar Roofs below).

SPRAYING FOAM ON COAL TAR ROOFS: Coal tar used in roofing will soften substantially when heated, even on older roofs. When spraying foam onto coal tar roof surfaces, it's important that heat build-up due to the polyurethane foam reaction exotherm be minimized. Excessive heat build up could result in delamination between the foam and the existing built-up roof surface or between the built-up roof plies.

Therefore, when applying foam to coal tar roofs, spray the first foam pass ½" to ¾" in thickness and allow the first pass to cool for 15 mm. before applying additional foam passes.

- New Construction and Tear-offs: Foam thickness should not be less than 2.0 inches for new constructions or tear-off's where the foam is being applied to an underlayment board or directly to the roof deck.

3. Existing Foam Roofs: New foam thickness should not be less than 1.5 inches when applying to a prepared existing foam roof surface.

Each pass thickness shall be a minimum of ½ inch. The full thickness of foam shall be applied to any given section within the same day.

Additional thickness may be applied to improve the existing drainage patterns. The finished foam surface shall be free of creases, excessive ridges, bumps, and other major blemishes.

The foamed roofs drainage should be checked after a rain for ponding water (½ inch or more of water in a 10-foot square area). Drainage channels can be cut using a rotary wire brush, or other suitable device, to eliminate standing water.

Other sources of standing or steady water, such as air conditioning condensation or cooling tower drippage, must be eliminated from the roof surface by plumbing to drain or other suitable means.

- D. Refoaming (Applying Foam over Foam): Each pass thickness shall be a minimum of ½ inch. The full thickness of foam shall be applied to any given section within the same day.

For any foam thickness added at a later date, the aged foam must be scarfed, primed, and checked for moisture with MDP (Moisture Detection Paper) strips prior to foaming. This procedure is to be used on all day-to-day foam tie-ins.

- E. Foam Surface: The finished foam surfaces shall be free of excessive ridges, bumps, and other major blemishes.

- F. Submittals: For each day of foaming, the following must be submitted:

- NCFI Daily Roofing Spray Foam Checklists for ENDURATECH Premier Roofing Systems
- Starting and ending foam slit samples showing all foam knit lines (pass lines).

- G. Inspections: Jobs to be warranted will be subject to inspection by NCFI during foaming.

3.03 PROTECTIVE COVERING APPLICATION

For vertical surfaces, details, exposed edges, and other areas where gravel may not be stable, apply an NCFI ENDURATECH coating system. Application rate and dry film thickness varies from coating to coating and depends on the warranty type requested. See NCFI EnduraRock Roofing System Coatings Specifications for specific requirements.

- A. Sidewall, Parapets, Exposed Edges, etc: sloped surfaces, vertical surfaces, and other surfaces that will not hold gravel, e.g. exposed roof edges, shall be coated with an NCFI ENDURATECH coating system. The coating shall be applied as indicated in NCFI EnduraRock Roofing System Coatings Specifications. The base coat shall be applied the same day as the foam or in accordance with the NCFI EnduraRock Roofing System Coatings Specifications.

Non-draining roof edges shall be coated 12 inches in from the roof edge toward the field of the roof using two coating applications to achieve full coating thickness.

Draining edges shall be coated 6 inches in from the roof edge toward the field of the roof using only one coating application to achieve half the normal coating thickness.

Roof corners shall be coated 10 feet in from the roof corner toward the field of the roof using one coating application to achieve half the normal coating thickness.

- B. Gravel: Gravel shall be applied to achieve a minimum one inch thickness over all flat portions of the roof (typically requiring 8 lb/sq ft).

Gravel stored on the roof should be kept in small piles near the roofs periphery to minimize stresses to the roof deck.

After most gravel has been applied, it should be raked to insure uniform distribution and additional gravel added to areas thinner than one inch.

Note: If the building structure will allow it, heavier application of gravel and/or larger gravel size may be used. For warranted projects, NCFI must pre-approve any gravel specification variance.

- C. Open Mesh Traffic Mats: Install open mesh traffic mats on top of gravel at foot fall areas (roof doors, stepping areas at fixed ladders, etc.).

3.04 FIELD QUALITY CONTROL

Jobs to be warranted will be subject to inspection during the edge coating and gravel application.

ATTACHMENT A

WARRANTY QUALIFICATIONS AND REQUIREMENTS

Applicator Qualifications: To receive a warranty, a job must be completed by a Tier One Applicator having a current Qualified Applicator's Agreement in force with NCFI.

Additional Requirements:

- a) The job must have been completed in accordance with these EnduraRock Roofing System Specifications.

Changes or exceptions from these specifications must be pre-approved in writing from NCFI.

- b) A final inspection of the job will be made by NCFI. All deficiencies will be noted by NCFI and corrected by the applicator.
- c) All warranty fees and materials will be paid prior to the issuing of a warranty.